

WILDLIFE DISEASES



BRETT WIEDMANN

The radio collar allowed biologists to locate and determine that disease was cause of death to this bighorn sheep.

New Threats and Old Standbys

By Greg Freeman

North Dakota wildlife populations are generally in good shape and most people assume – with good reason – that a severe winter will be the next great equalizer.

Who could forget 1996-97, the most recent winter that fell under that “severe” category over the entire state? North Dakota’s pronghorn population declined nearly 80 percent, pheasant harvest fell by almost 60 percent, and mule deer license numbers were eventually cut by 35 percent to start the rebuilding process.

But those declines, dramatic as they may seem, don’t quite compare with a die-off of approximately 90 percent of the bighorn sheep herd south of Interstate 94 during the summer of 1998.

Like winter, disease is also a threat to North Dakota wildlife. Some diseases have occurred here naturally for centuries. Others are more recent imports that came from other continents or are carried by domestic animals that did not exist on the plains 200 years ago.

So far, diseases that affect wildlife are not generally a danger to humans who handle carcasses or eat the meat. However, some can cause spectacular die-offs that decimate wildlife populations, typically within a local area, but occasionally over a large region.

The North Dakota Game and Fish Department, like other state wildlife agencies, keeps an eye open for wildlife disease occurrences. Some of this monitoring is labor intensive, such as recent efforts to detect chronic wasting disease in the state. In other cases biologists investigate deaths or sickness of individual animals.

Here’s a rundown on some of the diseases that are a danger to North Dakota’s wildlife.

Sheep Don’t Mix

Disease in bighorn sheep can devastate populations. “Generally, up to 90 percent of the population can be lost when bighorns suffer a disease outbreak,” said Brett Wiedmann, Department bighorn sheep biologist, Dickinson. “Disease outbreaks are oftentimes less severe in other big game populations.”

All big game animals carry bacteria called *Pasteurella*. However, domestic sheep and domestic goats carry a strain of *Pasteurella* that is capable of causing disease. When bighorn sheep come into contact with domestic sheep, the bacteria is passed to bighorns, where it can infect the lungs and cause rapid death from pneumonia. In 30 documented cases of bighorns coming into contact with domestic sheep, a minimum of 75 percent of the bighorns died, whereas the domestic sheep always remained healthy.

That’s why throughout North America the top concern with any bighorn management program is eliminating contact with domestic sheep and goats. “Simply because when these interactions occur, 100 percent of the time the wild sheep population is devastated by disease,” Wiedmann said.

Disease was likely a significant factor in

the late 1800s when North America's bighorn sheep population declined from an estimated 2 million to fewer than 15,000 animals. "A lot of that had to do with the western expansion of domestic sheep throughout the bighorn's historic range, causing wild sheep to rapidly die in astronomical numbers," Wiedmann said. "Mountain rivers were actually clogged and fouled with thousands of dead bighorn sheep during this time."

Recent research has shown that domestic goats are just as toxic to bighorns. In the late 1990s in western North Dakota, bighorn sheep likely came in contact with domestic goats grazing to control leafy spurge. An estimated 80-90 percent of the bighorn sheep in the southern badlands died, Wiedmann said. In Hells Canyon, Oregon in the mid-1990s, Oregon Department of Fish and Wildlife personnel figure two domestic goats came in contact with bighorns, which eventually led to the death of 260 bighorn sheep within eight weeks.

There are three different strains of *Pasteurella*, one of which – *P. haemolytica* – is very dangerous to bighorn sheep. "Any chance we get we will collect tonsil swabs from bighorns," Wiedmann said. For instance, when a hunter harvests a bighorn sheep, a tonsil swab is used to obtain a throat culture sample that is sent to a lab to determine what species of *Pasteurella* is present.

"*Pasteurella haemolytica* is the problem, and this strain is very prevalent in domestic sheep and domestic goats," Wiedmann said. "That is why they are so toxic to bighorns."

All big game species also have certain strains of *Pasteurella* that are not dangerous to bighorn sheep. In addition, domestic sheep carry strains that are not dangerous to mule deer.

Since the late 1990s die-off, Game and Fish developed a policy that requires biologists to destroy bighorn sheep that are known to come into contact with domestic sheep. Typically, young rams venture away from their close knit herd looking for mates, interact with domestic sheep, and then head back to the wild herd. "In essence, they become disease vectors," Wiedmann said. "The unfortunate policy has to be the destruction of those animals before they get back to the healthy herd."

Colleagues at Custer State Park in South Dakota suspect four young rams temporarily dispersed from the park and hooked up with domestic sheep. South Dakota Game, Fish and Parks personnel managed to destroy one of those rams, but not the other three. "They suspect those three rams came back to the park, resulting in the loss of approximately 75 percent of the 275 bighorns that were in the park," Wiedmann said. "Once outbreaks occur, there is nothing that can be done. You just have to let it play out."

A major problem in rebuilding bighorn sheep herds is that population growth is slow compared to other big game. "We have to artificially transplant bighorns back into those areas, and it may take up to 10 years to reestablish the population to a level that existed prior to the die-off," Wiedmann said.

Compounding the problem, those animals that survive a disease outbreak become carriers of *Pasteurella haemolytica*, and research has shown that for the next 3-5 years their lambs will likely succumb to pneumonia soon after birth. With few survivors and no lamb recruitment for five years, the population is often extirpated at that point, Wiedmann said.

The Game and Fish Department, Wiedmann said, has a policy with the U.S. Forest Service that states domestic sheep and goats cannot be grazed on Forest Service lands within 10 miles of known bighorn sheep habitat. However, there is nothing that prevents domestic sheep or goats from grazing on private land in bighorn country.

"Bighorns view domestic sheep as a drug," he said. "Young rams see them and want to be with them, unknowing that it will likely lead to their death."

The intermediate juvenile (4-5 years old) rams want to breed during the rut, but the 8-10 year-old rams won't let them. "So, they develop an affinity for domestic sheep, and go off searching for ewes," Wiedmann said. "They wander off and interact with domestic sheep and bring disease factors back to the wild population. The 10-mile buffer minimizes the probability of these rams finding domestic sheep."

One of the primary goals of an on-going telemetry project is to analyze cause-specific mortality – how long North Dakota sheep

live and why they are dying. "We collect biological samples from these mortalities in order to identify the occurrence and prevalence of diseases affecting bighorn sheep," Wiedmann said.

BIGHORN THREATS

When bighorns are born, they do not typically disperse from their paternal home ranges. Too many sheep in one area will eventually lead to full carrying capacity in that area, which significantly increases the likelihood of a disease outbreak. Wildlife managers generally attempt to maintain bighorn populations well below carrying capacity.

Other diseases of concern with bighorn sheep:

- Lungworm – A naturally-occurring parasite that is transmitted by ingesting gastropods or from ewe to fetus. High concentrations may result in pneumonia outbreaks and could aggravate the effects of *Pasteurella*.
- Scrapies – A neurological disease similar to CWD found in deer.
- Pink eye – Usually transmitted by domestic goats and often leads to blindness.
- Contagious ecthyma – A skin condition caused by a virus resulting in lesions on the nose, lips, rectum and/or teats. Often results in the death of lambs due to an inability to nurse. Usually transmitted by domestic goats.
- Scabies – A condition where crusty scabs form on the body due to mite infestations. Effects may be worse in areas where bighorns are highly concentrated.
- Blue tongue/EHD – Two distinct diseases with similar effects. Transmitted by midges/gnats, resulting in severe fever and death.
- Johnes Disease – Caused by bacterial infection, resulting in severe diarrhea and wasting.
- Leptospirosis – A water-borne disease caused by bacteria that affects the kidneys and liver.
- Chronic sinusitis/Nose bots – Caused by a fly and results in tooth deterioration.

In 1998, following the major die-off, North Dakota's bighorn population was reduced from about 250 total animals to only 125, with only 16 remaining south of Interstate 94 in the southern badlands. Since then, the agency has conducted two instate transplants and two out-of-state transplants. With out-of-state transplants and lamb recruitment, the statewide population is back to about 250 sheep. The Minnesota-Wisconsin Chapter of the Foundation for North American Wild Sheep has covered all the costs of the projects, Wiedmann said. "They look at North Dakota and see all the gains we have made, so

they have been more than willing to fund these projects.

"Wild sheep populations tend to ebb and flow," Wiedmann added. "We have been flowing very well here for a few years, but I always remain a pessimist because you never want to get too complacent with bighorns."

CWD

Chronic wasting disease has received a lot of attention the past number of years, even though it is not known to have killed any deer in North Dakota.

CWD affects the nervous system of white-tailed deer, mule deer and elk and is always fatal.

How much of an effect it would have on the deer population depends on which part of the state the disease would surface, said Dorothy Fecske, Department wildlife disease biologist.

"We would be more concerned if it was detected in the southeast portion of the state than if it was found in the southwest, just because of the higher density of the deer in that area," Fecske said. "Higher population densities aid in the spread of these types of diseases."

If CWD was detected in an area, the Department would sample within that region to see how prevalent the disease is. "If left unchecked, it would just get out of hand over

a period of a few years," Fecske said.

One of the benefits of the way Game and Fish manages the deer population in North Dakota is that, in general, the deer herd doesn't get too old. "What we have learned from attending CWD symposiums is that CWD is more prevalent in older animals, especially bucks. Therefore it is important to increase the turnover time of the deer herd," Fecske said. "We don't manage for trophy bucks, so deer tend not to get too old. A three-and-a-half year old deer is basically old in North Dakota."

The Game and Fish Department has been aggressive in testing for CWD through Targeted and Hunter-Harvested Surveillance programs. In addition, a governor's proclamation that establishes guidelines for transportation and importation of white-tailed deer, mule deer and elk carcasses into North Dakota has been in place since 2003 as a precaution against the possible spread of CWD into the state. "Hunters are restricted to what they can bring back from other states when hunting in areas with documented cases of CWD," Fecske said.

In addition, the North Dakota Board of Animal Health has strict regulations for bringing in captive deer or elk from other states. "A risk assessment is done to verify the health of the herd where the animals are being brought in from," Fecske said. "Also, regulations ensure those animals are kept segregated from wild deer and elk."

Game and Fish has been monitoring the state's deer and elk herd for CWD since 2002, Fecske said. "We have tested more than 4,000 deer and 80 elk taken during the 2002-04 hunting seasons, and to date, CWD has not been diagnosed in wild or farmed deer or elk in North Dakota."

In 2005, samples of 1,500 deer were sent to the Wyoming State Veterinary Lab, and results are expected in early spring.

CWD is a threat to reach North Dakota, Fecske said, because it has been found in many surrounding states, including Colorado, Wyoming, Wisconsin, South Dakota, Nebraska, Montana, Minnesota, and Canadian provinces of Saskatchewan and Alberta.

Scientists have found no evidence that CWD can be naturally transmitted to livestock, but new evidence out of Colorado has shown that moose, too, can get the disease.

Biologists test animals for a variety of diseases when captured.



CRAIG BIHRLE

CRAIG BIHRLE

"Livestock, pronghorns, and bighorn sheep have not contracted the disease, even though they were often exposed to it under research conditions," Fecske said.

The Colorado Division of Wildlife confirmed that a bull moose killed by an archer in 2005 tested positive for CWD. Until this discovery, CWD had only been found in the wild in deer and elk. Deer, elk and moose are all members of the deer family, but unlike deer and elk, moose do not form herds or large social groups.

In 2005, samples from 8-10 North Dakota moose were submitted for testing, said Bill Jensen, Department big game biologist. "It's something we'll keep doing," he said. "We have no choice.

Bovine Tuberculosis

Bovine tuberculosis is a contagious disease caused by the bacteria *Mycobacterium bovis*. Bovine TB mainly affects domestic livestock, but can be transmitted to wildlife species,

including deer. "We do test for this disease from samples collected during our Hunter-Harvested Surveillance Program," Fecske said.

Bovine TB has never been found in wild animals in North Dakota. However, the Minnesota Department of Natural Resources announced in mid-January that a deer harvested in fall tested positive for TB. "The deer was shot in an area where several cattle herds were diagnosed with Bovine TB earlier in the year," Fecske said.

The disease is spread through nose to nose contact, by inhaling the bacteria, or ingesting it from feeds that have been contaminated. Carnivores can become infected with bovine TB by eating carcasses of infected animals.

Big game feeding and baiting is an obvious hazard for the spread of tuberculosis. Deer are attracted to sites with desirable feed, Fecske said, which increases the likelihood of infection and spreading the disease. "A contaminated animal will leave secretions on a

food pile, and other big game animals will ingest that by eating from that food source," she said.

Bovine TB mainly affects the respiratory tracts of animals. Symptoms of the disease include abscesses in lymph nodes; lesions on the lungs, ribs and other organs; and progressive emaciation. The disease is an important public health issue, Fecske said, because humans can become infected.

Sarcoptic Mange

Sarcoptic mange, a skin disease that's bothersome to even look at, causes irritation of the skin, flaking, cracking and hair loss on furbearers such as coyote and fox. The loss of insulating hair on animals makes them vulnerable to North Dakota weather and many die, Fecske said. "Mange is still prevalent in the state and seems to affect red foxes more than other species," she said.

Mange first showed up in north central North Dakota in coyotes nearly two decades ago. The disease is caused by a mite. The female mite burrows into the skin, creating a tunnel where it deposits eggs. After the eggs hatch, the larvae move to the skin's surface and transform from nymph to adult, enabling the cycle to repeat itself.

In 2005, the percentage of coyotes with mange taken in North Dakota dropped compared to 2004, Fecske said. Mange in the fox population during the same time, however, increased slightly.

The North Dakota Game and Fish Department has been aggressive in testing for chronic wasting disease through Targeted and Hunter-Harvested Surveillance programs. (Below) Samples from hunter-harvested deer are readied for shipment to a lab for CWD testing.



EHD

Epizootic hemorrhagic disease caused deer deaths in western North Dakota in 1995, 2000, 2003 and 2005. EHD is a naturally occurring virus that is spread by a biting midge.

It surfaces periodically in southwestern and western North Dakota, said Jensen. "Sometimes the outbreaks are isolated and affect a few animals," Jensen said. "In other cases, outbreaks spread over a large geographic region with significant white-tailed deer mortality in localized areas."

Each year this disease kills hundreds, if not thousands, of deer in a range extending from Florida to Alberta, and in many of the east and west coastal states, Jensen said.

Historically, EHD outbreaks are most noticeable when high whitetail populations combine with hot, humid and wet late summer and early fall conditions, which create ideal breeding situations for the biting midge.

EHD causes dehydration and a high body temperature, causing deer to seek water prior to death. "Deer are generally found dead in or near water," Jensen said.

EHD is almost always fatal to infected white-tailed deer, while mule deer and pronghorns do not usually die from the disease, Jensen said. EHD is not a danger to humans, and cannot be contracted by handling or consuming infected deer meat.

"Hunters do not have to worry about eating infected deer, as any deer infected with EHD will have died well before deer gun season opens," Jensen said.

Presently, nothing can be done to prevent EHD in deer populations. "Our best defense against EHD is to maintain deer populations below a level where disease becomes a major mortality factor, and the best proven method of doing that has been through a legal and regulated harvest," Jensen said.

Dead Ducks

Many waterfowl enthusiasts are familiar with botulism – caused by a toxin produced by the bacterium *Clostridium botulinum*.

"Bird watchers and hunters alike take note when there are tens, if not hundreds of dead waterfowl along some shorelines in the late summer months," said Mike Szymanski, Department migratory game bird biologist.

Botulism die-offs usually happen as outbreaks, Szymanski said, because spores from the bacterium are always present, and when conditions are right, spores reproduce at a much faster rate.

Once a duck dies, flies and other insects swarm to the carcass. Bacteria colonizing the decomposing carcass produces a toxin concentrated in the maggots. Other ducks or birds might eat the larvae because they are nutritionally a quality food source.

"A single carcass can produce thousands of maggots; other ducks and birds will eat some of those and die," Szymanski said. "As healthy ducks eat maggots from ducks that recently died from eating toxic maggots themselves, those new ducks likely will die much faster, as with each cycle, the abundance of maggots will increase."

Some areas perennially have conditions associated with botulism outbreaks, Szymanski said, and those wetlands are monitored fairly closely by the U.S. Fish and Wildlife Service and Game and Fish. In particularly bad years, Game and Fish Department personnel help where they can throughout the state.

"Outbreaks usually happen in the northern breeding areas in late summer when we have really hot stagnant conditions," Szymanski said. "It typically tapers off by mid-September in North Dakota, about the same time as the days start getting cooler and the fly/maggot cycle tapers off."

It is difficult to determine just how many birds die, Szymanski said, because they decay rapidly under those conditions. An adult mallard can disappear in a matter of days. In advanced stages, birds die within hours of ingestion. Sick ducks also tend to crawl into dense vegetation to hide from predators.

Sarcoptic mange, and unsightly disease, causes irritation of the skin, flaking, cracking and hair loss on furbearers such as coyote and fox.



DARCY KRAMLICH

PROPER GAME HANDLING AND COOKING

Most wildlife diseases are not transferable to humans, either by contact or eating the meat of an infected animal. For the few diseases that can transfer, the risk can be eliminated with proper handling and cooking.

That said, the Game and Fish Department does not recommend harvesting any animal that appears sick or is behaving unusually. Same goes for animals that are taken and found to have unusual or suspicious characteristics.

The Game and Fish Department also recommends that hunters wear rubber gloves any time they field dress or clean game. All game meat should also be thoroughly cooked to an internal temperature of at least 165°F.

Some signs birds are sick include a loss in function of their wing muscles from paralysis, and/or the inner eyelid becomes paralyzed. "The most obvious, and heartbreaking, is when their neck muscles become paralyzed," Szymanski said. "Then they can't keep their head up above water, causing them to drown."

Birds can be saved if the disease is caught early enough, by giving them fresh water, shade, and injecting them with antitoxin. "But the chances of catching it in its early stages, and being able to transport the birds to holding facilities, are pretty slim," Szymanski said.

Another common disease occurring throughout the entire species range of dabbling (puddle) ducks in North America is sarcocystis, more commonly referred to as "rice breast." A parasitic infection caused by protozoan, the signs of infection are cylindrical cysts most commonly found on the breast muscle that runs parallel with the muscle tissue.

"There really are no visible signs of infection until you start cleaning the duck," Szymanski said, "and then it is quite obvious."

Rice breast is usually not fatal to ducks, but it might reduce their survival rate because it could weaken birds significantly in some cases.

Sarcocystis is not a known health hazard to humans.

The unsavory job of collecting dead waterfowl that have fallen victim to botulism.



Bird Flu

Avian influenza has received a lot of national interest, and much is still not known. At this point it is not an immediate threat to North Dakota wildlife.

"However, one important thing to remember is that influenza viruses are common in birds, just like in humans," Szymanski said. "Everything gets viruses, sometimes you get sick, and some viruses are more potent than others."

Part of the concern is that migratory birds will bring the strain from Asia, coming through the Bering Strait into Alaska.

"It is tough to say what would happen if the virus showed up in North America," Szymanski said. "Responses by agencies would differ depending on if there was a human pandemic occurring or if it was just detected in birds."

Probably the biggest concern, according to Szymanski, might be a drastic decline in hunter participation due to fear. "It's an unknown at this point," he said. "I'm not sure it would kill a lot of birds because some species are more resistant to the virus than others."

At this time, hunters don't need to be overly concerned about the virus, Szymanski said, because it has not been identified in wild birds in North America. "Migratory birds aren't really known to be spreading the virus, so as of now, humans aren't really catching it from wild birds," he said.

GREG FREEMAN is the Game and Fish Department's news editor.

PLAGUE PROBLEMS

Plague is an infectious disease caused by the bacterium *Yersinia pestis*. Plague did not occur in North America until 1899. Infected mammals are referred to as having sylvatic plague, and in humans, bubonic plague.

Many mammals with sylvatic plague, such as voles and mice, have a high resistance to the disease and do not experience large die-offs. The effects on others, especially prairie dogs, can be substantial. These animals have low resistance and high mortality. Plague in prairie dog towns in many states south of North Dakota has killed every prairie dog within a short period of time.

Fleas carry the plague virus, but the majority of fleas are not infected. Those infected spread the virus from animal to animal, or animal to human, but fleas prefer to bite animals over humans. There is slight risk humans may become infected by direct contact with infected tissue of an animal, or through inhaling the respiratory drops of infected animals, such as the highly susceptible domestic cat.

There are no confirmed incidents of sylvatic plague in black-tailed prairie dogs in North Dakota. If plague were to reach the state, the potential prairie dog loss could lead to reciprocal losses and declines in burrowing owls, golden eagles, or even recreational opportunities. An average of 13 human cases of plague occurs in the U.S. per year. Plague is a serious concern for wildlife populations and human health.

WEST NILE VIRUS

Even though West Nile virus has swept across the state the past few years, much is still unknown about the disease, specifically the extent to which its presence is found in wild game.

There is no evidence that people can become infected with WNV from eating meat from an infected animal.

WNV is spread to humans, birds and other animals through the bite of an infected mosquito. A mosquito becomes infected by biting a bird that is carrying the virus.